

## Original Article

## An Outbreak of Pre-parturient and Post-parturient Clinical Hypocalcemia in a Camel's Herd in Iran

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**ABSTRACT**

**Background:** Desert plants cannot provide all the animals' requirements for calcium and mineral deficiency in camels. This condition is mostly aggravated in dry seasons. The present study investigates hypocalcemia in pre-parturient and post-parturient camels.

**Methods:** In a camel herd, 25 out of 96 pregnant animals showed clinical signs of hypocalcemia within a week after parturition. Two camels had abortions, and 9 animals that gave birth died. The blood samples were collected from the animals, and their calcium and phosphorus concentrations were measured using a commercial kit.

**Results:** The clinical and necropsy signs resemble a decline in blood calcium, and the level of calcium and phosphorus had fallen below the normal range in all tested blood samples. Most camels recovered after the administration of injectable calcium and adding supplementary nutrition.

**Conclusion:** Paying attention to mineral balance, especially in the last months of pregnancy and in recently parturient camels, is crucial.

**Keywords:** Calcium, Camel, Hypocalcemia, Phosphorus

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## 1. Introduction

Camels which are resistant species to dehydration and heat are adapted for living in arid lands and eating prickly desert resources (Lamuka et al., 2017). Nevertheless, such desert plants cannot provide all the animal's nutritional requirements, especially in pregnant camels. Minerals, including calcium, are essential in the metabolic profile of camels (Deeba et al., 2020; Dereje et al., 2016). The population of Iranian camels is 180000, and almost all of them are raised in the traditional system and in desert areas where along with nutritional deficiencies (Mohammadpour et al., 2020), they are exposed to wild animals attack, which jeopardizes camels' health by diseases such as rabies (Ahmed et al., 2020; Esmaeili et al., 2012). Mineral deficiency in camels is mostly visible in dry years in this country, and the breeders lack easy access to veterinary utilities. Moreover, in this system, camels rarely receive mineral-rich supplementary feeds.

Several studies have shown a decline in the level of calcium and phosphorus as the weather gets warmer and water availability reduces (Ahmed et al., 2013; Aichouni et al., 2011; Deeba et al., 2020). In a study in 2007 in southern Darfur, the blood profile of camels was investigated in the dry season. In this research, the calcium level in the dry season was 2.03 mmol/L, while in the green season, it was 2.2 mmol/L (Amin et al., 2007). Adding 0.5%-0.6% calcium and 0.3%-0.35% phosphorus to the camel diet fulfills the animal's requirements (Deeba et al., 2020). This paper investigated an outbreak of hypocalcemia in prepartum and parturient Kalekuhi camels which showed different stages of clinical signs of the disease during late winter and early spring in a farm located in a desert region between Tehran and Qom provinces, Iran. To our knowledge, it is the first report of hypocalcemia occurrence in Iranian camels.

## 2. Materials and Methods

### Study animals

There were 96 pregnant camels among a herd of 300 Kalekuhi camels kept between Tehran and Qom cities. A total of 25 pregnant animals showed clinical signs such as depression, muscle tremors, stiffness of the limbs, and recumbency within 7-10 days post-parturition. Two camels aborted their fetuses after 7 days of recumbency and during the disease course, and 9 ones died.

### Collection of blood

Blood samples were collected from 16 animals with clinical signs. A volume of 10 mL of blood was poured into the heparinized tubes and then centrifuged at 1800 g for 20 minutes in the lab. Plasma was separated for the determination of calcium concentration.

### Calcium and phosphorus determination

The total concentration of plasma calcium and phosphorus was measured by spectrophotometry using a commercial kit (Pars Azmoon, Tehran, Iran) by an automated analyzer.

## 3. Results

The observed clinical signs in the involved animals were teeth grinding, profound depression, muscle tremors, increased heart rate, stiffness of the limbs, ataxia, and finally, sternal recumbency, which indicated hypocalcemia in the animals. Sternal recumbency was visible within a week post-parturition. The level of calcium and phosphorus fell below the normal range in all the tested blood (Table 1).

**Table 1.** Calcium and phosphorous levels in the camels with clinical signs of hypocalcemia

The Bio-chemical Parameter	Normal Range	The Camels																Mean±SD
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Calcium (mg/100 mL)	8.4-12.4	2.2	1.5	2	1.8	1.5	2.1	1.3	1.3	2.3	1.4	1	1.4	2.5	1.7	2.3	1.7	1.75±0.439
Phosphorus (mg/100 mL)	4.8-8.4	2.1	2.3	2.4	2.3	2.6	2.5	2.3	2.7	2.7	2.4	2.6	2.1	2.5	2.7	3	2.1	2.4±0.263

After the administration of calcium, magnesium, and phosphorus (Nasr Company, Iran) and improved nutritional status by adding supplements, all animals recovered except 9 camels who died of severe hypocalcemia.

#### Post-mortem examinations

Necropsy findings of the 9 dead camels included enlarged yellow liver, muscle necrosis of the limbs, and distended bladder.

#### Treatment protocols

As the laboratory results showed hypocalcemia and hypophosphatemia in the camels, 250 mL of Calcimaphor 40 (Nasr Company, Iran) was injected slowly into the jugular vein, followed by 250 mL subcutaneous injection in sick animals. Moreover, 250 mL of the drug was injected subcutaneously into the healthy, recently parturied animals. The animals' feed was enriched by adding 0.5% calcium and 0.3% phosphorus.

## 4. Discussion

In the present study, the clinical signs were close to milk fever disease in cattle. Moreover, the necropsy findings of the 9 dead camels included injuries such as fatty liver, which indicated negative energy balance and muscle damage due to the ischemia resulting from prolonged recumbency. Distended bladder due to the inability of the animals to urinate occurred following smooth muscle paralysis. Our laboratory results indicated that the herd suffered hypocalcemia, so we treated the animals using Calcimaphor 40, which along with calcium, provided magnesium and phosphorus. After the treatment protocols, the camels, which had shown primary stages of hypocalcemia, and even two animals in the sternal recumbency stage of the disease, gradually recovered. As our laboratory results showed in the Table, hypocalcemia is associated with hypophosphatemia, and treatment with calcium borogluconate will restore both conditions.

In the studied herd, the pregnant camels grazed in harsh circumstances with roughage grasses such as Tamarix and Haloxylon, so as they parturied and produced milk, blood calcium declined in levels which showed severe signs of milk fever in the animals. The calcium level depends on the type of plants, season, and soils of the area in which camels are kept. In a study in Algeria in 2013, the serum calcium and phosphorus levels in summer were 2.07 mmol/L and 1.94 mmol/L, respectively, while in winter, these levels rose to 2.47 mmol/L and 2.23 mmol/L, respectively (Ahmed et al., 2013).

Because 25 out of 96 pregnant and parturied camels suffered hypocalcemia in the current study and economic losses due to the death of 9 animals, paying attention to mineral deficiency in the last months of pregnancy and, recently, parturied camels is crucial. In other words, although camel is a resistant species among ruminants, inadequate minerals and malnutrition can affect the health status and productivity of the animal, especially in a transitional period. In addition to calcium, magnesium, and phosphorus are essential in maintaining blood calcium levels in their normal range, so other minerals imbalance should be considered in cases of camels with hypocalcemia.

## Ethical Considerations

### Compliance with ethical guidelines

There were no ethical considerations to be considered in this research.

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### Authors' contributions

Methodology, data collection, and data analysis: Hossein Esmaili and Ali Khanjari; Conceptualization and writing—original draft: Hossein Esmaili and Mona Hamed; All authors contributed to the article and approved the submitted version.

### Conflict of interest

The authors declared no conflict of interest.

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## مقاله پژوهشی

## شیوع هیپوکلسمی بالینی قبل و بعد از زایمان در یک گله شتر در ایران

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## چکیده



**زمینه مطالعه:** کلسیم نقش مهمی در توانایی انقباض عضلات صاف دارد و مقادیر بالایی از این ماده معدنی در اواخر آبستنی مورد نیاز است. گیاهان صحرائی قادر به فراهم آوردن تمام نیازهای حیوانات برای کمبود کلسیم و مواد معدنی در شتر که بیشتر در فصول خشک قابل مشاهده است، نیستند.

**هدف:** مطالعه حاضر هیپوکلسمی را قبل و بعد از زایش شترهایی که مراحل مختلفی از علائم بالینی بیماری را نشان دادند بررسی می‌کند.

**روش کار:** در یک گله شتر ۲۵ نفر از ۹۶ حیوان آبستن طی یک هفته علائم بالینی هیپوکلسمی را نشان دادند. دو شتر جنین خود را سقط کردند و ۹ نفر بعد از زایمان تلف شدند. نمونه خون جمع‌آوری و غلظت کلسیم و فسفر با استفاده از آنالایزر خودکار Selectra Pro M اندازه‌گیری شد.

**نتایج:** علائم بالینی و کالبدگشایی شباهت زیادی به کاهش کلسیم خون داشت و سطح کلسیم و فسفر در تمام خون‌های آزمایش شده به زیر حد نرمال کاهش یافته بود.

**نتیجه‌گیری نهایی:** با توجه به حضور شترهایی که در مطالعه حاضر دچار هیپوکلسمی شده‌اند، توجه به تعادل مواد معدنی به‌ویژه در ماه‌های آخر آبستنی و در شترهای تازه‌زا بسیار مهم است.

**کلیدواژه‌ها:** شتر، کلسیم، فسفر، هیپوکلسمی

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